

# CO (2-1) OBSERVATIONS OF MAFFEI 2

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Maffei 2 is a highly obscured galaxy, probably of type Sbc, at a distance of 5 Mpc (Allen and Raimond 1972; Spinrad et al. 1973). Since it lies close to the Galactic plane, there is considerable confusion in infrared and 21-cm HI observations due to Galactic emission, but investigations of its structure can be carried out at millimeter wavelengths where the Galaxy contribution is confined to a limited velocity range. The high resolution (30") of our CO J=2-1 observations permits both a detailed examination of Maffei 2 and a study of the nature of the gas in its nucleus, through comparison with the CO J=1-0 observations.

The CO (2-1) observations were made with one of the 10.4 meter telescopes at the Owens Valley Radio Observatory in January, 1983, using an SIS receiver (Sutton 1983) and a 512-channel acousto-optical spectrometer (cf. Masson 1982). The frequency width of each channel was 1.03 MHz, 1.34 km s<sup>-1</sup> at 230 GHz. The receiver temperature, T<sub>r</sub> was 550 K SSB. Spectra, taken at spacings of 0.3' on a grid oriented along the major axis of the galaxy (PA = 30°), are shown in Figure 1. The central position, marked by

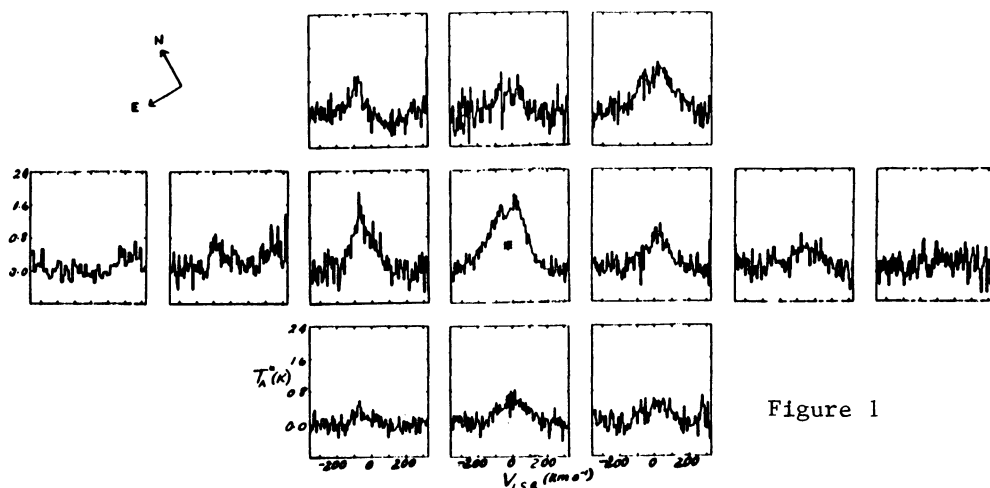


Figure 1

an asterisk, is  $\alpha$  (1950) =  $02^{\text{h}}38^{\text{m}}08^{\text{s}}.5$ ,  $\delta$  (1950) =  $+59^{\circ}23'24''$ . At  $-7 \text{ km s}^{-1}$  and  $-56 \text{ km s}^{-1}$  there is some evidence of Galactic emission in the reference position (see the dip near zero velocity in Figure 2). Assuming the source to be just resolved, a beam coupling efficiency 0.52 was adopted in our determination of the corrected antenna temperature,  $T_A^*(2-1)$ . While variations in peak velocity are consistent with the rotation curve, CO(2-1) emission is much more confined than CO(1-0) and 21-cm HI radiation (Rickard et al. 1977; Bottinelli et al. 1972).

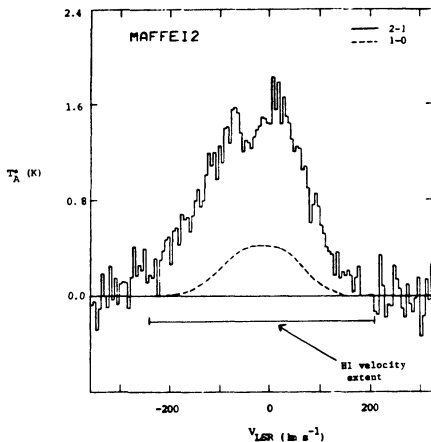


Figure 2

In Figure 2, our central CO(2-1) profile, the CO(1-0) profile from Rickard et al. (1977) and the velocity extent of the 21-cm HI emission from Bottinelli et al. (1972) are reproduced. Published values of  $T_A^*(1-0)$  were corrected assuming a beam efficiency of 0.65 (Ulich and Haas 1976) and a source size  $1''$  at CO(1-0). Peak  $T_A^*(2-1) = 1.6\text{K}$ , significantly higher than peak  $T_A^*(1-0) = 0.4\text{K}$ . If the nuclear source is ultra-compact, much of this discrepancy could be the effect of beam dilution, but it seems more likely that gas in the nucleus of Maffei 2 is at least partially optically thin, as in the active galaxy, M82 (Sutton et al. 1983).

Nuclear activity is often evident in galaxies with nearby companions. Maffei 1, a giant elliptical, is only  $40''$  from Maffei 2 on the plane of the sky but, assuming a mass-to-light ratio of 30, is at a distance of 1 Mpc (Spinrad et al. 1971). Adopting instead  $M/L = 6$  (Sargent et al. 1978) puts Maffei 1, like Maffei 2, at about 5 Mpc. Thus Maffei 1 and Maffei 2 may be companion galaxies and interaction between them may have influenced star formation in Maffei 2.

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